

Initial	Date
CW	4-22-93
ENR	4/22/93
EW	4/22/93

BA/EN
WR MT
Mail Stop 60190

APR 22 1993

Memorandum

To: Assistant Regional Director, Refuges and Wildlife
Attention: Barney Schranck

From: Regional Engineer, Region 6

Subject: 1992-1993 Annual Water Use Report/Management Plan

The subject reports for Medicine Lake and Lamesteer National Wildlife Refuges, and NE Montana Wetland Management District have been reviewed and approved as submitted. We concur with the Manager's plan to contact Montana Department of Natural Resources and Conservation and other water users to advise them of Refuge water needs for 1993. We have revised the Water Use Report/Management Plan Short Form and are forwarding to the Refuge for future use.

1. Once new area-capacity tables have been developed, we suggest that the tables be revised to show water in storage, rather than deficits for each pool.
2. Note that the deficit figure reported last year is not the same number as reported for 1991 in Table I-1. Also, the acre-foot figure for December 31 deficit should be the same as the acre-foot figure for January 1 deficit the following year in Table I-2. With the exception of these inconsistencies, the report is an excellent documentation of Refuge water use.

Please extend our thanks to Refuge personnel for the timely submission of this report.

/S/ WILLIAM A. GODBY

bcc:EN rf
RO rf
Medicine Lake NWR
EN:CWilliss:lc:4/21/93

done

ANNUAL WATER MANAGEMENT REPORT AND PLAN

1992 Water Use Report Recommended 1993 Water Management Plan

Medicine Lake National Wildlife Refuge
Medicine Lake, Montana

January 21, 1993

Submitted: Theodore W. Gutzke Date: 1-21-93
Refuge Manager

Reviewed: _____ Date: _____
Associate Manager, Zone 1

Reviewed: _____ Date: _____

Reviewed: _____ Date: _____

I. 1992 WATER USE REPORT

A. General

The 1980's Northern Great Plains drought continued into the 1990's in northeastern Montana. Total precipitation at the official National Weather Service station at Medicine Lake NWR was 12.80 inches compared to the 54 year (1939-1992) average of 13.39 inches. This did not help the water situation on the refuge, it only made conditions worse. To have a positive impact on refuge water areas a substantial amount of runoff must result from spring snow melt. That did not happen this year. Although excellent rains occurred in April through July, much of that was absorbed into the soil and did not result in runoff into refuge water units. It did however produce the best agricultural crops in the areas history, but poor water conditions for wildlife.

Total water diversion for 1992 from Big Muddy Creek was 4,480 acre feet. That amount was insignificant in comparison to the amount needed to meet refuge plans and objectives. There was minimal or no flow from other creeks into remaining refuge lakes which did little to recharge them. The result was that refuge impoundments started the year in fair or poor shape and declined in condition throughout the year.

With minimal snow fall in the watershed, there was only a minor flow in Big Muddy Creek from spring snowmelt. Largest flows occurred during the summer when a few locally heavy thunderstorms sent two or three small surges down the creek channel.

On January 1, 1992, the refuge water deficit was 45,972 acre feet. By year's end the deficit was at 48,610 acre feet. Table I-1 indicates the early 1992 deficit by water unit with comparison to recent years. Table I-2 compares 1992 water deficits with stream flow, diversions, and releases.

B. Water Rights

A detailed discussion of water rights filings was included in the 1989 Water Use Report. That report should be consulted for a summary of refuge water rights claims and applications.

No action has been taken by the Montana Water Court on any of the applications the Service submitted for Medicine Lake NWR in the 1982 refiling process. Based on progress the Water Court is making in settling claims in other basins, it is likely to be several years before the Big Muddy Creek watershed is adjudicated.

Use of water from Big Muddy Creek by up-stream farm irrigators consumed a small percentage of the stream flow. A letter to each junior upstream user requested that they refrain from taking any water until our needs were met. All junior water rights holders complied with our request, although there was a lot of grumbling.

Table I-1. Comparison of Water Deficits in Acre Feet by Unit on January 1.

Unit Name	Unit Capacity in Acre Feet #	Unit Deficit in Acre Feet				
		1992	1991	1990	1989	1988
Medicine Lake	88,290	28,042	22,337 28,000	21,744	24,185	(@)
Homestead	8,216	7,465	8,050	7,509	7,509	7,509
Lake 12	2,500*	2,325	2,250	1,580	1,580	(@)
Katy's Lake	1,850*	1,850	1,850	1,850	1,850	
Lake 11	497*	497	497	438	438	
Lake 10	1,150*	1,000	1,050	968	904	
Deep Lake	450*	367	337	277	376	
Sayer Bay	787	757	686	500	711	
Gaffney Lake	4,694	3,292	2,962	2,599	2,851	
Long Lake	377*	377	377	377	377	
Totals	108,811	45,972	40,396	37,842	40,781	(@)

At management elevations

* Amounts are estimates based on surface acres and approximate mean depth.

@ Deficits not available for this year

1991 - last year's report

Table I-2. Summary of Water Deficits, Diversions and Releases in Acre Feet.

Year	Water Deficit January 1	Water Diverted	Water Released	Water Deficit December 31
1992	45,972	4,480.0	0	48,610
1991	40,396	12,562.0 ^(2,350)	1,582	42,287
1990	37,842	3,464.4	0	46,259
1989	40,781	22,719.5	2,745	37,842
1988	*	122.0	1,000	40,781

* Information not available

C. Actual Use

1. Type of Use

a. Stream Flow and Diversions

Indian Service Dam at the Homestead Unit remained closed all year. Dam #1 was closed from January to March. On March 9 a screw gate was opened 12" to provide water downstream to the Homestead Unit. A total of 921 acre feet of water was diverted into the Homestead Unit. Most of the water (865 acre feet) was diverted by gravity flow into Homestead Lake. A Crisafulli pump placed downstream of the Indian Service Dam was used to pump 56 acre feet of water into the west Homestead sub-impoundment.

Table I-3. 1992 Water Diversions by Stream and Location of Use.

Source	Acre Feet Diverted	Unit Where Used	Period of Diversion
Big Muddy Creek	3,280 (1)	Medicine Lake	Mar - Sept
Big Muddy Creek	921 (3)	Homestead Lake	Mar - Sept
Cottonwood Creek	255 (2)	Lake 10, Lake 11, Gaffney Lake, Sayer Bay	Apr - June
Sand Creek	0 (2)	Lake 10, Sayer Bay, Gaffney Lake	N/A
Lost Creek	0 (3)	Homestead Lake	N/A
Sheep Creek	0 (3)	Homestead Lake	N/A
Lake Creek	20 (2)	Lake 12	May
TOTAL	4,476		

(1) Measured by U.S. Geological Survey, Ft. Peck MT.

(2) Measured by refuge staff at stream gages.

(3) Diversion estimated by refuge staff.

b. Discharges

No water was discharged from any of the refuge water impoundments in 1992.

2. Wells

There were six water wells in use on the refuge in 1992. Table I-4 indicates estimated water use from those wells.

Table I-4. Ground Water Use From Refuge Wells in 1992.

Well Name	Location	Purpose	Period of Use	Amount *
Headquarters #1	Sec 33, T32N R56E	Yard irrigation	Jan - Dec	2.0 AF
Headquarters #2	Sec 33, T32N R56E	Household and Office	Apr - Nov	1.2 AF
Oil Well # 13	Sec 13, T32N R57E	Industrial	Jan - Dec	0.7 AF
Oil Well #14	Sec 14, T32N R57E	Industrial	Jan - Dec	0.7 AF
Sandhills #1	Sec 17, T31N R57E	Livestock	May - Sept	0.3 AF
Sandhills #2	Sec 8, T31N R57E	Livestock	May - Sept	0.2 AF
Sandhills #3	Sec 20, T31N R57E	Livestock	May - Sept	0.4 AF
South M-4	Sec 23, T31N R56E	Livestock	May - Sept	0.2 AF
Homestead	Sec 3 T31N R55E	Livestock	May - Sept	0.2 AF
TOTAL				5.9 AF

* Estimated acre feet used

D. Maintenance, Rehabilitation and Construction

MMS construction projects at Homestead Lake inlet and outlet structures, and the Gaffney Lake outlet to Tax Bay were complete by January, 1992. Work at Homestead included the replacement of the three CMP risers with concrete structures and reattachment to the three 36" intake CMP's. The outlet structures concrete apron was replaced and spalled areas on the structure were repaired. The Gaffney Lake outlet had spalled areas repaired and the road above the structure was widened to allow safer access for farm equipment. Two concrete bullards were constructed adjacent to the screw gate control for protection from possible collision. A catwalk was constructed at the Homestead Lake inlet and new stop logs were installed. The Homestead inlet and outlet structure had all metal portions of the catwalk and bridge painted by YCC enrollees.

E. Impoundment Data

As soon as ice breaks up on refuge impoundments each spring, water level gage readings are recorded. Gages are then checked at least weekly during spring run-off. After water levels stabilize, gages are checked monthly until water units freeze up again in late fall.

Following is a discussion of management for each of the ten refuge impoundments and tables displaying water levels throughout the season.

1. Medicine Lake

Diversions into Medicine Lake from Big Muddy Creek continued through the winter with small amounts of water (0.5 to 2 CFS) flowing under the ice on the creek. By March 9, ice on the creek had broken up and water was moving freely. With no spring flood conditions, all stream flow remained in the creek channel this year. Water measurements at the Dam # 2 diversion weir are a very accurate representation of actual stream flow. The creek continued to run through the spring and summer. Peak flows occurred April 22, 23, and 24 with 74, 111, and 75 CFS after a two inch rain on April 20. Flow declined to less than 10 CFS through much of the summer until a 0.30 inch rain fell in mid July and raised flows to 35 CFS on July 16. On October 8, water reached a level that it no longer flowed over the diversion weir and remained like that rest of the year.

Snow cover on Medicine Lake was minimal throughout the winter. As a result, oxygen levels remained high. In contrast to the major fish-kill that occurred in 1989, few winter killed fish were found when ice-out occurred on April 8.

Table I-5. Medicine Lake Gage Readings and Water Deficits in 1992.

Medicine Lake Management Level is 1935.77 feet MSL Unit Capacity is Estimated at 88,290 Acre Feet			
Month	Surface Elevation	Difference From Management Level	Water Deficit in Acre Feet
January	1931.33	-4.44	28,024 28,042
February	1932.10	-3.67	
March	1931.80	-3.97	
April	1931.70	-4.07	
May	1931.55	-4.22	
June	1931.40	-4.37	
July	1930.90	-4.87	
August	1930.70	-5.07	
September	1930.60	-5.17	
October	1930.52	-5.25	
November	1930.14	-5.63	
December	1930.14	-5.63	29,618

2. Lake 12

Inflow from Lake Creek was practically non-existent this year. The creek was dry when stream gages were activated in April. Starting in May, springs up stream from the refuge provided some water but not enough to make a showing on the gage. Total stream flow was measured at 20 acre feet.

The lake started off very low, and remained that way throughout the year. By freeze-up the remaining water consisted of several scattered shallow pools separated by wide mud flats. There was no discharge from the lake downstream to Lake 11 or to Katy's Lake.

Table I-6. Lake 12 Gage Readings and Water Deficits in 1992.

Lake 12 Management Level is 1948.52 feet MSL Unit Capacity is Estimated at 2,500 Acre Feet			
Month	Surface Elevation	Difference From Management Level	Water Deficit in Acre Feet
January	1942.11#	-6.41	2,325**
February	*		
March	*		
April	*		
May	*		
June	*		
July	*		
August	*		
September	*		
October	*		
November	*		
December	1942.05#	-6.47	2,450**

* Water below gage

** Estimated water deficit

Elevation checked with surveying instruments

3. Katy's Lake

There were no diversions and no runoff from surrounding uplands to Katy's Lake in 1992. Water levels in the lake remained below the gage throughout the year. There was sufficient water to maintain about 100 yards of very shallow open water around the island (Shawver Island) built by Ducks Unlimited in 1986. The water deficiency for the unit remained at about 1,850 acre feet throughout the year.

4. Lake 11

The year began with Lake 11 dry. There were no flows from Cottonwood Creek until April 20 when a two inch rain added water into the unit. The limited amount of water lasted only until early August when the unit was again dry. At year's end the water deficit was 497 acre feet.

Table I-7. Lake 11 Gage Readings and Water Deficits in 1992.

Lake 11 Management Level is 1945.53 feet MSL Unit Capacity is Estimated at 497 Acre Feet			
Month	Surface Elevation	Difference From Mgmt Level	Water Deficit in Acre Feet
January	#		497**
February	#		
March	#		
April	1942.28	-3.25	
May	1941.60	-3.93	
June	*		497**
July	*		
August	#		
September	#		
October	#		
November	#		
December	#		

* Water below gage

** Estimated water deficit

Water unit dry

5. Lake 10

Lake 10 received limited stream flow from a two inch rain on April 20 and a 3/4 inch rain on May 11. Water levels in Lake 10 are normally well supported by the water table and such was the case this year with water levels rising from January to mid-May. However, lack of stream flow or significant precipitation began to take its toll by mid-summer. Water levels fell below the gage in July. By the end of September, pools that normally support large numbers of canvasbacks, tundra swans and other waterfowl were dry.

Table I-8. Lake 10 Gage Readings and Water Deficits in 1992.

Lake 10 Management Level is 1938.66 feet MSL Unit Capacity is Estimated at 1,150 Acre Feet			
Month	Unit Surface Elevation	Difference From Management Level	Water Deficit in Acre Feet
January	1935.02 #	-3.64	1000**
February	*		
March	*		
April	*		
May	1935.72	-2.94	
June	1935.38	-3.28	
July	*		
August	*		
September	##		
October	##		
November	##		
December	##		1,150**

* Water level below gage

** Estimated water deficit

Elevation checked with surveying instruments

Water unit dry

7. Gaffney Lake

Gaffney Lake received inflow from a two inch rain on April 20 and a 3/4 inch rain on May 11. The lake remained below the Tax Bay discharge gate all year. Exposed sand bars that appeared two years ago from low water remained and divided the lake into five pools. Although numerous springs in the lake helped to maintain minimum levels. Waterfowl use in the fall was substantial in comparison to other small lakes but still below what is normally expected. A float gage was installed in May 1991 which made it possible to record elevations down to 1331.46. Lower than that level the gage was not functional.

Oxygen levels during the winter reached critical levels and a fish kill resulted. Once water opened up in the spring the unit was used extensively for a month by bald and golden eagles feeding on fish carcasses.

Table I-9. Gaffney Lake Gage Readings and Water Deficits in 1992.

Gaffney Lake Management Level is 1937.00 feet MSL Unit Capacity is Estimated at 4,694 Acre Feet			
Month	Lake Surface Elevation	Difference From Management Level	Water Deficit in Acre Feet
January	1931.54 #	-5.46	3,292**
February	1931.54 #	-5.46	
March	1931.86	-5.15	
April	1932.14	-4.86	
May	1932.06	-4.94	
June	1931.78	-5.22	
July	1931.66	-5.34	
August	1931.66	-5.34	
September	1931.60	-5.40	
October	*		3,417**
November	*		
December	1931.33 #	-5.67	

* Water level below gage

** Estimated water deficit

Elevation checked with surveying instruments

8. Sayer Bay

Sayer Bay was the same as last year -- no inflow and generally declining water levels all year. By year's end the only water in the unit was found in the old creek channel. No avian botulism outbreak occurred in the unit this year.

Table I-10. Sayer Bay Gage Readings and Water Deficits in 1992.

Sayer Bay Management Level is 1938.66 feet MSL Unit Capacity is Estimated at 787 Acre Feet			
Month	Unit Surface Elevation	Difference From Management Level	Water Deficit in Acre Feet
January	1932.35 #	-6.31	757**
February	*		
March	*		
April	*		
May	*		
June	*		
July	*		
August	*		
September	*		
October	*		
November	*		
December	1932.07 #	-6.59	762**

* Water level below gage

** Estimated water deficit

Elevation checked with surveying instruments

9. Long Lake

Long Lake was dry the entire year. At both the beginning and the end of the year the water deficit in the lake was estimated at 377 acre feet.

10. Deep Lake

Deep Lake received no run-off this year. Even though water levels declined through the summer, because of its depth, it retained some water throughout the year. Submergent vegetation growth appeared to be good. The lake received good use by diving ducks during the late summer and fall.

The float gage located on the north shore of the lake has not been effective in providing water elevations since it was installed in 1989. The gage was not set low enough to reach the declining water table.

Table I-11. Deep Lake Gage Readings and Water Deficits in 1992.

Deep Lake Management Level is 1938.66 feet MSL Unit Capacity is Estimated at 450 Acre Feet			
Month	Lake Surface Elevation	Difference From Management Level	Water Deficit in Acre Feet
January	1931.95	-6.71 #	367**
February	*		
March	*		
April	*		
May	*		
June	*		
July	*		
August	*		
September	*		
October	*		
November	*		
December	1930.26	-8.40 #	395**

* Water below gage level

** Estimated water deficit

Elevation checked with surveying instruments

11. Homestead Lake

The year began with Homestead Lake very low. There were no inflows from Sheep Creek and Lost Creek this year. Both the Sheep Creek and Breaser subunits, which depend upon Sheep Creek were dry throughout the year.

Diversions of water from Big Muddy Creek to Homestead Lake began March 30 using water passed through the Unit #1 structure on Big Muddy Creek. It quickly became apparent that there would be insufficient water available to fill the entire lake. The WCS in the new Knudsen Bay dike was then closed to retain all diverted water in the north portion of the lake. As a result Knudsen Bay remained dry through the year. Total transfer of water from Big Muddy Creek to the Homestead Unit was estimated at 921 acre feet. Of this amount 865 acre feet went into Homestead Lake and 56 acre feet was pumped into the western subimpoundment using a Crisafulli pump. It took a total of 12 days of pumping from March 24 to April 3, using the John Deere tractor as the power source, to fill the unit with 56 acre feet of water. The flooded area had a rapid response by dabbling ducks for pair and spring feeding water. Later the subimpoundment was teeming with waterfowl broods. This technique worked so well we will use it again in 1993 if water levels remain low. There was no fall diversion into Homestead Lake from Big Muddy Creek.

Although the management level was not reached, water levels in north Homestead Lake held up fairly well after diversions ended in late April. By mid-summer it appeared that avian botulism would not be a serious problem and no water was discharged from the unit. However by years end the lake was nearly dry.

Table I-12. Homestead Lake Gage Readings and Water Deficits in 1992.

Homestead Lake Management Level is 1930.40 feet MSL Unit Capacity is Estimated at 8,216 Acre Feet			
Month	Unit Surface Elevation	Difference From Management Level	Water Deficit in Acre Feet
January	1926.30	-4.10	-7,465
February	1926.30	-4.10	-7,465
March	1926.41	-3.99	-7,241
April	1927.05	-3.35	-6,650
May	1927.08	-3.32	-6,600
June	1926.90	-3.50	-6,985
July	1926.72	-3.68	-7,104
August	1926.37	-4.03	-7,317
September	1926.18	-4.22	-7,587
October	1926.05	-4.35	-7,622
November	1926.05	-4.35	-7,622
December	1925.15#	-5.25	-8,094

Elevation checked with surveying instruments

F. Water Quality Monitoring

No water quality readings were taken on any refuge water units in 1992.

II. RECOMMENDATIONS AND OBJECTIVES FOR WATER MANAGEMENT IN 1993

A. General Recommendations for Refuge Impoundments and Water Management

As 1993 begins all refuge impoundments are seriously short of water. Prospects for a good flow of spring run-off are problematic because of low top soil moisture and low water levels in retention dams throughout the watershed. The following recommendations are made with the aim of achieving maximum refuge benefits from water which is available for diversion to refuge water units.

1. Use all stream flow available at refuge diversion points to fill refuge impoundments according to the priorities shown in Table II-1 as early as possible to ensure retaining appropriated flow from spring run-off and to achieve wildlife management objectives.
2. Fill eastern impoundments with flows from Lake Creek, Sand Creek and Cottonwood Creek before allowing these waters to enter Medicine Lake. Water should not be discharged from Sayer Bay until after Gaffney Lake and Long Lake have reached 1993 management levels. Take all necessary actions to prevent upstream migration of carp from Medicine Lake to Sayer Bay, Gaffney Lake, or Long Lake during any manageable overflow situation.
3. Provide as much flushing action as possible from all lakes with available spring and summer run-off. This will improve water quality by reducing salinity.
4. Continue to collect water quality information by taking salinity and conductivity readings for all major water flows entering or being discharged from the refuge. Spring and late fall readings should be collected, as in the past, for all major impoundments. The collection of these data will document any changes in water quality occurring over the years.
5. Monitor all stream and unit gages at least weekly during spring runoff and monthly thereafter to insure accurate measurement of water conditions and use.

B. Water Use Priorities and Planned Diversions

Table II-1 indicates the priority of water use on the refuge. Priority 1 impoundments will be filled and maintained before priority 2 impoundments. Priority 3 units will be filled last.

Table II-2 indicates the amounts of water which will potentially be diverted at each major point of diversion and where that water will be used. The maximum planned diversion for 1993 is 48,610 acre feet. That is the estimated water deficit on January 1, 1993.

Table II-1. Proposed 1993 Water Use Priority

Unit	Management Purpose	Priority	Acre Feet
Lake 12	1. Waterfowl nesting, brooding, 2. Water storage	1	2,450 ✓
Katy's Lake	1. Waterfowl nesting 2. Water storage	1	1,850 ✓
Lake 11	1. Waterfowl nesting, brooding, 2. Water storage	1	497 ✓
Lake 10	1. Waterfowl nesting, brooding 2. Water storage	1	1,150 ✓
Gaffney Lake	1. Waterfowl nesting, brooding 2. Waterfowl migration staging 3. Water storage 4. Fishery	2	3,417 ✓
Deep Lake	1. Waterfowl nesting, brooding 2. Water storage	1	395 ✓
Long Lake	1. Waterfowl nesting, brooding 2. Piping plover nesting 3. Water storage	3	377 ✓
Sayer Bay	1. Waterfowl nesting, brooding 2. Water storage	1	762 ✓
Medicine Lake	1. Waterfowl nesting, brooding 2. Waterfowl migration staging 3. Piping plover nesting 4. Water storage 5. Fishery	3	29,618 ✓
Homestead Lake	1. Waterfowl nesting, brooding 2. Water storage 3. Waterfowl migration staging	1	8,094 ✓
Sheep Crk Unit	1. Waterfowl nesting, brooding	1	(500)* ^u
Breaser Unit	1. Waterfowl nesting, brooding	1	(500)* ^j
Knudsen Bay	1. Waterfowl nesting, brooding 2. Waterfowl migration staging	2	(2,600)* ^j
TOTAL			48,610

* included in Homestead Lake total

Table II-2. Planned Diversions by Point of Diversion in 1993.

Point of Diversion	Contributing Stream & Claim Number	Maximum Diversion Rate	Places of Use	Planned Diversion for 1993
NWSE Sec 22 T32N R55E	Big Muddy Creek #233169	1200 CFS	Medicine Lake	29,618
NESE Sec 28 T31N R55E	Big Muddy Creek #233168	50 CFS	Homestead Lake	8,094
SESW Sec 13 T32N R57E	Lake Creek #233167	100 CFS	Lake 10, 11, 12 Katy's Lake Deep Lake Gaffney Lake Long Lake Sayer Bay Medicine Lake	Entire flow to 11,338 A.F.
NWSE Sec 23 T32N R57E	Cottonwood Creek #233163	100 CFS	Lake 10 & 11 Deep Lake Gaffney Lake Long Lake Sayer Bay Medicine Lake	Entire flow to 6,588 A.F.
SE Sec 22 T32N R57E	Sand Creek #233164	75 CFS	Lake 10 Deep Lake Gaffney Lake Long Lake Sayer Bay Medicine Lake	Entire flow to 6,091 A.F.
SESW Sec 33 T31N R55E	Sheep Creek #233166 #242886	320 CFS	Homestead Lake	Entire flow to 8,094 AF
SESW Sec 33 T31N R55E	Lost Creek #233165	25 CFS	Homestead Lake	Entire flow to 8,094 AF
TOTAL PLANNED DIVERSION *				48,610 AF

* The total acre feet indicated is less than the sum of the column. The total shown is the total water deficit as of January 1, 1993. Amounts indicated for each diversion is the total acre feet needed for the listed water units if no water was available from other sources.

C. Specific Recommendations and Objectives for Individual Impoundments for 1993

1. Homestead Lake and Subunits

This 2,170 acre impoundment is very low and will require approximately 8,050 acre feet of water to meet management objectives. All flows from Sheep Creek, Lost Creek and Big Muddy Creek will be retained in this impoundment until it is filled. If spring water flows appear to be below normal again, all available water flows from the Big Muddy Creek will be allowed to bypass the Dam # 1 structure and continue down Big Muddy Creek. It will then be diverted into Homestead Lake at Dam #6 inlet structure until the lake is brought up to the full operational elevation of 1930.40. With a cross dike dividing Knudsen Bay from the remainder of the lake, if water supplies are short, the north part of the lake will have priority for filling. Additionally, pumping of water into the western subimpoundment will be accomplished if gravity flow water diversions are not adequate to fill the unit.

To the maximum extent possible, the Homestead water units will be filled with flows from Sheep Creek and Lost Creek. This will preserve Big Muddy Creek flows for diversion to Medicine Lake. If adequate flows appear to be available to fill all Homestead units as well as Medicine Lake, flushing of Homestead will be accomplished by diverting water into the lake and then releasing water through Dam #6 discharge structure back into the Big Muddy Creek channel.

Specific Objectives for Homestead Lake in 1993

- a. Bring the unit up to management level as quickly as possible in the spring to provide optimum waterfowl breeding pair habitat.
- b. Maintain water levels at management elevations through June 1 to provide optimum over-water nesting sites in emergent vegetation for waterfowl and waterbirds.
- c. Maintain water around the constructed nesting islands to provide secure nesting sites for geese and other waterfowl through July 1.
- d. Aquatic vegetation should flourish in this relatively shallow impoundment.
- e. To reduce the hazard and severity of avian botulism, Knudsen Bay will be drawn down beginning in late June. Water released must be controlled to prevent flooding the access crossing to hay fields downstream. Water will be retained in the North Bay. If botulism occurs there, sufficient water will be discharged to expose the stands of emergent shoreline vegetation which seem to be associated with some botulism outbreaks.
- f. Water will be released from Medicine Lake in mid-September and diverted into Homestead Lake if sufficient water exists. Levels will be brought to a minimum elevation of 1926.76 MSL to provide fall migration habitat for waterfowl. Up to 2,000 acre feet of water from Medicine Lake will be required to accomplish this objective.

2. Lakes 10, 11, 12, Deep Lake and Gaffney Lake

Water levels for this series of water units are all dependent on spring run-off from Cottonwood, Lake and Sand Creeks. The present water level of these units range from four to five feet below management levels. Upstream impoundments will be filled first, then each impoundment below. If flows are adequate, water control structures will be opened rather than relying on spillways. This provides the best flushing action, and allows for the reduction of accumulated salinity in these units.

Specific Objectives To Be Met In 1993

- a. Fill all impoundments to operational levels as early as possible to provide breeding pair habitat and secure island nesting sites for Canada geese.
- b. If water reaches operational levels, breeding pair habitat for waterfowl will be maximized on most impoundments.
- c. Do not exceed operational levels to minimize loss of goose nesting sites and to reduce erosion by wave action on constructed and natural nesting islands.
- d. After spring runoff, no water releases or drawdowns will be accomplished unless demanded by outbreaks of botulism. By maintaining water levels as close to operational levels as possible, brood habitat will be optimized. After losses to evaporation and underflow, levels will remain adequate for fall migration.
- e. Lakes 10 and Gaffney have been historic sites for avian botulism. Rapid flooding of shallow areas following heavy summer rains may trigger outbreaks in these impoundments. They can be minimized or the severity reduced by maintaining constant water levels. If a serious outbreak of botulism occurs in these units, consideration will be given to drawing the units down to levels sufficient to dry out the botulism hot spots.
- f. When Lake 10 reaches management level, water will be passed first to Sayer Bay and Deep Lake then to Gaffney Lake after Sayer Bay and Deep lake are filled.
- g. When Lake 12 reaches management level, water will be diverted equally to Katy's Lake and to Lake 11. If Lake 11 has already reached the management level or appears likely to, all water surplus from Lake 12 will be diverted to Katy's Lake before being released downstream.

3. Katy's Lake

Katy's Lake is a natural sump and has no outlet to provide the option of flushing. It is also the most saline lake on the refuge. Limited surface drainage and diversion of water from Lake 12 are the only sources of fresh water for this marsh unit.

Specific Objectives for Katy's Lake In 1993

- a. If water is available, Katy's lake should be filled to the maximum operational level before any discharges are made from Lake 12 to Lake 11.
- b. Katy's Lake has a history of botulism. Rapid rises in mid-summer water levels must be prevented to alleviate losses.

4. Sayer Bay

This is an excellent waterfowl production unit and provides excellent migrational habitat as well. Severe avian botulism outbreaks have occurred in this area, however, and disease is a yearly concern on this unit.

Specific Objectives for Sayer Bay in 1993

- a. To maximize breeding pair and brood habitat, the unit will be filled to a management level of 1938.66 if water is available. No water will be discharged from Sayer Bay until Gaffney and Long Lakes have reached their management levels.
- b. This impoundment will be closely monitored for avian botulism. With the large number of adult waterfowl and broods utilizing the area, the potential for significant botulism losses is high. If a major outbreak occurs, it is recommended to pull stop logs, and quickly draw the water level down to about the 1935.0 elevation. At this elevation the shallow water along the edge is eliminated. This method was used effectively to reduce losses in 1984. Prevention of rapid increases in water levels, following heavy mid-summer thunderstorms, is desirable. Reflooding of shallow vegetated mud flats may trigger an avian botulism outbreak.

5. Long Lake

Management level for Long Lake in 1993 will be 1937.16. This is 1.5 feet below the traditional management elevation. This change was made to provide shoreline nesting habitat for nesting piping plovers which have nested or attempted to nest there for the last several years.

Specific Objectives for Long Lake in 1993

- a. Filling of Long Lake should begin when water can be discharged from Gaffney Lake.
- b. Water levels will be brought up to maximum elevation to flood out vegetation that has encroached since the unit has been dry. After May 1 an elevation of 1937.16 will be reached which should be sufficient to leave some exposed beaches for piping plover use around the south shore line.
- c. Inflow from Gaffney Lake should be terminated upon reaching Long Lake management level. If sufficient water is available to fill Gaffney Lake to its management level, then additional water should be passed through Long Lake and discharged into Medicine Lake. This will assist in flushing some of the high salt concentrations present in the unit.

6. Medicine Lake

The January 1, 1993 elevation of the lake was 1930.14, 5.63 feet below the operational level of 1935.77. To fill the lake to management level will require about 29,618 acre feet of water. Since Medicine Lake is a priority 3 impoundment, it will receive run-off from tributaries only after other impoundments are filled. Once Homestead Lake reaches operational level in the spring, all available waters from Big Muddy Creek will be diverted into Medicine Lake.

Some of the early flow into Medicine Lake should be immediately discharged to flush accumulated silt from the discharge channel east of Dam #4. If run-off exceeds 29,618 acre feet and the lake reaches management level, overflow at the Dam #4 spillway will begin at lake elevation 1935.77. Once the lake reaches management level, the weirs at the Diversion Dam #2 on Big Muddy creek will remain open, but, excess waters will be simultaneously discharged from the lake. If the lake elevation rises above management level by more than 0.5 foot the gates in Dam #4 must be opened to discharge excess water and bring the lake back to management level.

If heavy summer thunderstorms produce heavy silt laden waters in Big Muddy Creek, these waters may be prevented from entering Medicine Lake by opening the Dam #1 gates on Big Muddy Creek and closing the diversion canal. This will reduce sediment deposits on the west end of Medicine Lake.

Specific Objectives for Medicine Lake in 1993

By filling Medicine Lake to an elevation of 1935.77 feet in the early spring, the following objectives will be met.

- a. Waterfowl breeding pair habitat will be adequate. Water levels in emergent vegetation will provide nesting locations for over-water nesters including diving ducks, grebes, and black-crowned night herons.
- b. Natural islands will be secure and provide nesting sites for ducks, geese, pelicans, cormorants, and herons.
- c. Water levels may decrease, but must not increase after May 1 to protect nesting piping plovers on the lake shoreline.
- d. After normal evaporative loss during the summer, early fall water levels will still be adequate to allow water to be released to Homestead Lake. This will provide desirable migrational waterfowl habitat on both Homestead and Medicine Lake. This slightly reduced water level at Medicine Lake will still provide adequate water depth to protect the over-wintering fish populations.
- e. This elevation will provide excellent early spring northern pike spawning habitat in the emergent vegetation stands west of Highway #16.
- f. Erosion of islands and shorelines by wave action will not be excessive. This level has been commonly reached in past years without causing excessive erosion.

C. Construction, Repair, Maintenance and Rehabilitation

A number of projects are planned for 1993 on water management facilities. Following is a list and brief description of each proposed project.

Lake 11 & 12: MMS funding is available this year to replace or rehab these structures, depending on recommendations from RO Engineering. If funding and design are ready this year these impoundments may be dewatered to complete the necessary construction.

Sheep Creek Bay: Install a concrete slab on the spillway road crossing.

Medicine Lake: Relocate the lake float gage if it is found to be influenced by headquarters well #2.

Deep Lake: If the lake remains below the established float gage level, reinstall the float gage at a new and deeper level. Dismantle and remove the remains of the old WCS on the channel southeast of the lake.

Katy's Lake: Adjust the lake gage to the 1988 resurveyed management elevation.

Lake Creek Gage: Place rip-rap rock around the base of the gage support pipe. Explore with the landowner of the site (John Crohn) about development of a concrete flume located in the creek channel to improve water flow measurement capabilities.

Cottonwood Creek: Install a concrete weir in the creek channel to improve water flow measurement capabilities.

Homestead Lake: Install a staff gage at the inlet structure.

D. Other Planned or Needed Actions

1. Long Range Water Management Plan

A comprehensive long range water management and monitoring plan will be prepared this year if impoundment capacity tables and gage elevations are finalized. Although a lot of notes, reports, memos and other documents have been written over the years, a good reference and guiding plan is not now available. Such a plan, properly prepared, will greatly simplify preparation of the Annual Report/Plan.

2. Lake Capacity Tables

In 1989 the Region 6 Water Resources office prepared surface area and capacity tables for Medicine Lake and Sayer Bay. There are major discrepancies with the Medicine Lake tables and elevations used in determining the tables. Work with the Water Resources Office is necessary to correct the tables and elevations so that accurate estimates can be determined in the future. It would be of great benefit to the refuge water management program if area and capacity tables could be developed for all the refuge water units, and all staff gages were rechecked for accuracy.

3. Enforcement of Refuge Water Rights

Probably the most important recommended action is reserved for last. It relates to Service actions to insure the refuge receives the water it is entitled to from area streams during years of short flows. Since Big Muddy Creek is the primary source of water for Medicine Lake and Homestead Lake, upstream diversions of water from the creek can have a major impact on accomplishment of refuge objectives in years of low spring run-off.

The Service has on file with the Montana Water Resources Office, two claims on Big Muddy Creek with priority dates of August 19, 1935, for fish and wildlife management purposes. The claim for Homestead Lake is for 50 cubic feet per second and the claim for Medicine Lake is for 1,200 cubic feet per second.

For many years farm land irrigation has been conducted each spring in the Big Muddy Creek flood plain upstream from the refuge. During the high spring flow, usually in late March or April, irrigators use either diversion dams or large pumps to divert water from the creek channel to flood nearby crop or hay fields. During years of significant winter snows, the spring run-off is sufficient to provide water for both irrigation and refuge needs. After dry winters, as has been the case most years in the past decade, irrigators short-stop a substantial percentage of the water before it gets to the refuge. Many of the irrigation activities are based on claims or permits that are junior to the refuge water right.

To insure that the refuge gets its rightful share of water in 1993, the following steps are recommended:

a. Upon approval of this plan, the refuge should make a "call for water" in the form of a letter sent to the Montana Department of Water Resources and to all known irrigators in the Big Muddy Creek watershed. The letter should detail the refuge requirements for water, both in volume and period of diversion for 1993. This information is listed in Table II-2 of this report. The refuge should work closely with the Montana Water Resources Office and the Region 6 Water Rights Office prior to the call to insure the proper statements are made and the suitable message conveyed. Among other things, the letter should request those holding water rights junior to the refuge to voluntarily observe the refuge priority and refrain from diversions until the refuge objective for diversion has been met.

b. Upon the start of spring snowmelt, refuge staff should begin monitoring stream diversions up-stream from the refuge. Both ground vehicle and aerial surveys should be used as needed. When diversions are found which are confirmed to be junior to the refuge claim, refuge staff should contact the person conducting the diversion and request that they immediately terminate their diversion until they receive notice from the refuge that its claim has been satisfied.

c. After a contact has been made as described in "b" above, the diversion must be checked again the following day. If diversion continues, the Refuge Manager should immediately contact the Regional Office for assistance to legally stop the diversion, and will follow whatever legal procedures are necessary to enforce the refuge priority for water.

MEDICINE LAKE WELLS

W/R NO.	PRIORITY	FLOW	VOLUME		SEC	TNWP	RNG	
79006-G40R	08/05/1991	17 GPM	3.4 AF	NESESE	8	31N	57E (S)	M-3
78220-G40R	06/17/1991	20 GPM	.57 AF	NENENE	3	30N	55E (R)	BM
78219-G40R	06/17/1991	8.0 GPM	1.1 AF	SWSWNE	24	31N	57E (S)	M-4
10632-G40R	12/06/1976	25 GPM		SESWNW	33	32N	56E (S)	HQ2
61836-G40R	04/11/1986	4.0 GPM	.94 AF	NWNWSW	13	32N	57E (S)	#13
61842-G40R	04/23/1986	4.0 GPM	1.41 AF	NWNESE	14	32N	57E (S)	#14
SANDHILL #1		3.0 GPM		NENE	20	31N	57E (S)	
SANDHILL #2		3.0 GPM		SWNE	19	31N	57E	
STOCK POND #5		5.0 GPM		SWSE	19	31N	57E (S)	
STOCK POND #4		5.0 GPM		SESW	19	31N	57E (S)	
STOCK POND #3		5.0 GPM		NESW	19	31N	57E (S)	
#1		10.0 GPM		N2SW	18	31N	57E (S)	
#2 REED'S POND		10.0 GPM		NWNW	19	31N	57E (S)	
HEADQUARTERS		300 GPM		NWSW	33	32N	56E (S)	

**WATER MANAGEMENT PLAN/USE REPORT
SHORT FORM**

Roosevelt County
NE Montana WMD
Johnson Lake WPA
Station Name

07//12/92
Date of Inspection

40R-W-183196-00
Water Right No.

Unnamed Coulee
Source(s)

1992
Water Diverted: Yes ☐ No ☒

Means of Diversion Dam
Rate Natural flow of 200 CFS up
to 1,050 acree feet annually.

***Impoundment(s):** Yes ☒ No ☐

Water Level 0 acre feet
(Elevation or Est. Stored Amount)

***Well(s):**

Free Flowing ☐ GPM
Pumped ☐ GPM

Type of Use:

Surface Irrigation ☐
(Crop) ☐
Fish & Wildlife ☒
Stock ☐
Domestic ☐
Other ☐

Overall Climatic Conditions: No run-off in the spring of 1992. Lake remained dry throughout the year.

Condition of Facilities: Good.

Proposed Water Program: In 1993 store available runoff; flush excess water through the lake to reduce a buildup of salts.

Comments:

*If more than one impoundment or well, please attach additional sheets.

WATER MANAGEMENT PLAN/USE REPORT
SHORT FORM

Wibaux County
Lamesteer National Wildlife Refuge
Station Name

09/27/92
Date of Inspection

39G-W-183105-00
Water Right No.

Lamesteer Creek
Source(s)

1992
Water Diverted: Yes ___ No X

Means of Diversion Dam
Rate 647 acre feet/year

*Impoundment(s): Yes X No ___

Water Level 25 acre feet
(Elevation or Est. Stored Amount)

*Well(s):
Free Flowing ___ GPM
Pumped ___ GPM

Type of Use:
Surface Irrigation _____
(Crop) _____
Fish & Wildlife X _____
Stock _____
Domestic _____
Other _____

Overall Climatic Conditions: No known run-off in the spring of 1992. Very dry throughout the year.

Condition of Facilities: Fair to poor; dam and spillway in need of repair; SEED inspection conducted 11/27/90.

Proposed Water Program: In 1993 store available runoff; excess water will flow over the spillway.

Comments:

*If more than one impoundment or well, please attach additional sheets.

**WATER MANAGEMENT PLAN/USE REPORT
SHORT FORM**

Sheridan County
NE Montana WMD
Carlson WPA
Station Name

07//17/92
Date of Inspection

40R-W-183200-00
Water Right No.

Unnamed Coulee
Source(s)

1992
Water Diverted: Yes ☐ No ☒

Means of Diversion Dam
Rate Natural flow up to 40
acre feet annually.

***Impoundment(s):** Yes ☒ No ☐

Water Level 0 acre feet
(Elevation or Est. Stored Amount)

***Well(s):**
Free Flowing ☐ GPM
Pumped ☐ GPM

Type of Use:
Surface Irrigation ☐
(Crop) ☐
Fish & Wildlife ☒
Stock ☐
Domestic ☐
Other ☐

Overall Climatic Conditions: No run-off in the spring of 1992. Unit remained dry throughout the year.

Condition of Facilities: Good.

Proposed Water Program: In 1993 store available runoff; excess water will flow through culvert pipe spillway.

Comments:

*If more than one impoundment or well, please attach additional sheets.

WATER USE REPORT/MANAGEMENT PLAN - *SHORT FORM* - REPORT YEAR: _____

STATION NAME: CARLSON WPA MANAGING STATION: Medicine Lake NWR

WATER RIGHTS DATA

WATER RIGHT NO: 40R-W-183200 PRIORITY DATE: 11/17/32

SOURCE: Unnamed Coulee

WATER DIVERTED: YES X NO _____ IMPOUNDMENTS: YES X NO _____

MEANS OF DIVERSION: Dam AF STORAGE: 20.0 AF

RATE OF DIVERSION: _____ AF SEASONAL: 20.0 AF

WELLS: YES _____ NO X FREE FLOWING: _____ GPM or PUMPED: _____ GP

TYPE OF USE: Fish & Wildlife: XX Domestic: _____

Crop Irrigation: _____ Stock: _____

Other: _____

INSPECTION DATA

Please complete all pertinent information for ACTUAL use versus the Water Rights data.

DATE OF INSPECTION: _____ INSPECTED BY: _____

CONDITIONS AT INSPECTION:

AF STORAGE: _____ OR ESTIMATED ELEVATION: _____

WELLS: FREE FLOWING: _____ GPM OR PUMPED: _____ GPM

CONDITION OF FACILITIES: _____

OVERALL CLIMACTIC CONDITIONS: _____

PROPOSED WATER PROGRAM: _____

COMMENTS: _____

WATER USE REPORT/MANAGEMENT PLAN - *SHORT FORM* - REPORT YEAR: _____

STATION NAME: JOHNSON LAKE WPA MANAGING STATION: Medicine Lake NWR

WATER RIGHTS DATA

WATER RIGHT NO: 40R-W-183196 PRIORITY DATE: 12/31/1967

SOURCE: Unnamed Coulee

WATER DIVERTED: YES X NO _____ IMPOUNDMENTS: YES X NO _____

MEANS OF DIVERSION: Dam AF STORAGE: 766.0 AF

RATE OF DIVERSION: 200 cfs AF SEASONAL: 284.0 AF

WELLS: YES _____ NO X FREE FLOWING: _____ GPM or PUMPED: _____ GP.

TYPE OF USE: Fish & Wildlife: XX Domestic: _____

Crop Irrigation: _____ Stock: _____

Other: _____

INSPECTION DATA

Please complete all pertinent information for ACTUAL use versus the Water Rights data.

DATE OF INSPECTION: _____ INSPECTED BY: _____

CONDITIONS AT INSPECTION:

AF STORAGE: _____ OR ESTIMATED ELEVATION: _____

WELLS: FREE FLOWING: _____ GPM OR PUMPED: _____ GPM

CONDITION OF FACILITIES: _____

OVERALL CLIMACTIC CONDITIONS: _____

PROPOSED WATER PROGRAM: _____

COMMENTS: _____

WATER USE REPORT/MANAGEMENT PLAN - *SHORT FORM* - REPORT YEAR: _____

STATION NAME: LAMESTEER NWR MANAGING STATION: Medicine Lake NWR

WATER RIGHTS DATA

WATER RIGHT NO: 39G-W-183105 PRIORITY DATE: 04/17/1938

SOURCE: Lamesteer Creek

WATER DIVERTED: YES X NO _____ IMPOUNDMENTS: YES X NO _____

MEANS OF DIVERSION: Dam AF STORAGE: 427.0 AF

RATE OF DIVERSION: 280 cfs AF SEASONAL: 220.0 AF

WELLS: YES _____ NO X FREE FLOWING: _____ GPM or PUMPED: _____ GP.

TYPE OF USE: Fish & Wildlife: XX Domestic: _____

Crop Irrigation: _____ Stock: _____

Other: _____

INSPECTION DATA

*Please complete all pertinent information for ACTUAL use
versus the Water Rights data.*

DATE OF INSPECTION: _____ INSPECTED BY: _____

CONDITIONS AT INSPECTION:

AF STORAGE: _____ OR ESTIMATED ELEVATION: _____

WELLS: FREE FLOWING: _____ GPM OR PUMPED: _____ GPM

CONDITION OF FACILITIES: _____

OVERALL CLIMACTIC CONDITIONS: _____

PROPOSED WATER PROGRAM: _____

COMMENTS: _____